HEPATITIS C VIRUS KNOWLEDGE, ATTITUDES, AND PRACTICES AMONG ARIZONA PROVIDERS

A thesis submitted to the University of Arizona College of Medicine – Phoenix
in partial fulfillment of the requirements for the Degree of Doctor of Medicine

Leslie Appleton
Class of 2019

Mentor: Lisa Villarroel, MD, MPH

ACKNOWLEDGEMENTS

Paul Kang, MS MPH, Statistician

Shane Brady, MPH

Elizabeth Kim, MSPH

Matthew McEchron, PhD., Director of Scholarly Projects

ABSTRACT

Background: Hepatitis C is the most common chronic bloodborne infection in the United States. Currently in the U.S., there are more than an estimated 3 million people infected with hepatitis C. Here in Arizona, it is estimated that there may be as many as 80,000 Arizonans infected with hepatitis C (ADHS). Despite the availability of effective treatments for this chronic condition, treatment uptake remains low and is actually declining in the United States. This project investigates whether the knowledge, attitudes, and practices of Arizona providers regarding hepatitis C serve as a barrier to screening, diagnosis and care for HCV patients.

Methods: This study employs a standard Knowledge, Attitudes, and Practices (KAP) survey that is forty questions long, with up to four additional conditional questions if participants answer the preceding question in a particular way. Questions were entered into Qualtrics, an online survey software tool, and distributed electronically using eight AZDHS email listservs and county-specific email listservs with licensed providers in Arizona. True or false knowledge questions were converted to a binary scale with "1" representing a correct answer and a "0" representing an incorrect answer. Multiple choice knowledge questions were analyzed qualitatively. Attitudes questions on a Likert scale were converted to a numerical score (1-5), with a higher number score being associated with a more empathetic response. Practices questions were either converted to a binary scale or left in their original format for further qualitative analysis. Statistical analysis was completed using a mixture of Univariate Logistic Regression, Fisher's Exact tests, Wilcoxon Rank Sums, and Kruskal Wallis tests.

Results: 77 responses were included in the final data analysis. Overall, providers demonstrated adequate knowledge regarding hepatitis C transmission, but an overall lack of knowledge about hepatitis C. Only 24% of participants answered all knowledge questions correctly. Participants felt more empathetic toward patients who contracted HCV through a blood transfusion (average Likert score = 4.39) compared to those who contracted HCV through using IV drugs (average Likert score = 3.95). 71% of providers feel that HCV screening falls under their scope of practice. Despite feeling confident in their knowledge of who to screen for HCV (average Likert score = 4.16), only 41% of respondents routinely screen for HCV. A majority of respondents

preferred not to treat hepatitis C, mostly because they felt that was outside their scope of practice (53%). The most commonly cited reason overall for lack of treatment despite its potential benefit to patients was due to insurance coverage or cost concerns.

Discussion: Our results indicate that AZ providers have inadequate knowledge of hepatitis C that drives insufficient clinical practices around screening patients, diagnosing new cases, and helping manage these patients on a regular basis. Though they deem HCV to be a public health threat, their unfamiliarity treatment modalities, coupled with inherent biases towards some of this patient population is in opposition to their perceptions regarding their own capability and comfort levels in caring for these patients, indicating a further gap in their awareness of this issue and the vulnerability that this patient population faces.

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

INTRODUCTION, SIGNIFICANCE & RATIONALE

Hepatitis C is the most common chronic bloodborne infection in the United States (Alter, 1999). Currently, in the U.S., there are an estimated 2.5 million people infected with hepatitis C (Hofmesiter et al., 2018). Here in Arizona, it is estimated that there may be as many as 80,000 Arizonans infected with hepatitis C (ADHS). Hepatitis C is an acute or chronic liver disease caused by infection with the hepatitis C virus (HCV). Some patients infected with acute hepatitis C can clear the infection spontaneously, but as many as 85% of persons infected with HCV later develop chronic hepatitis C, which develops over several decades and may lead to additional complications and sequelae such as progressive hepatic fibrosis, cirrhosis, complications of liver failure, hepatocellular carcinoma, and death (Grebely et al., 2012). Hepatitis C is the leading cause of liver cancer and transplants, and here in the United States, HCV-related mortality has now surpassed HIV-related deaths, with over 15,000 individuals dying from HCV between 1999 to 2007 (Ly et al., 2012).

As a bloodborne illness, HCV is commonly transmitted via percutaneous passage of infectious blood, as commonly seen with intravenous (IV) or injection drug use, blood donation or transfusion, needle stick injuries, or maternal transmission to a fetus. HCV may also be spread through sexual contact with an HCV-infected person or other health care procedures, though these are much more rare and inefficient means of transmission. IV drug use accounts for 60% of HCV transmission in the U.S (CDC 1998). Studies report one third of young injection drug users (IDUs) aged 18-30 years as infected and older IDUs having a higher prevalence of infection in the seventy to ninety percent range. Because IV drug use is the most common method of HCV transmission, HCV patients are also at risk for HIV/HCV coinfection, and coinfection is a major cause of morbidity and mortality in HIV-infected patients (Schaerer et al, 2015).

Once infected, it may take years for an individual to present with any symptoms, and consequently, many persons, particularly IV drug users, unknowingly transmit HCV. Recent estimates suggest that the HCV epidemic will continue to grow in size and will eventually result in 80 million infections globally (Bruggmann, Grebely, 2014). Given the increasing concern

regarding the growing number of HCV cases and the known outcomes for HCV patients, public health organizations and officials including groups like the World Health Organization (WHO) have acknowledged HCV as a public health problem and worked to implement strategies to try to help prevent the spread of HCV and better manage those who are known HCV-infected patients.

Literature reviews reveal a number of studies that have examined the efficacy of various preventive interventions including needle syringe programs and medication-assisted treatment (MAT). Despite the demonstrated success of these programs, HCV infection remains a major public health concern as the number of cases continues to grow and other research shows that there is vast variation in the availability and uptake of HCV testing, screening, treatment, care, and support services (Jones et. al, 2013). Patients, healthcare providers, policy makers, and the public remain unaware of HCV and HCV literacy is also low among healthcare professionals and patients (Bruggman, Grebely, 2014); and clinical uptake of curative treatments now available such as direct-acting antivirals (DAAs) remains as low as 1-2% per year despite positive treatment responses, current guidelines for treatment, and high treatment willingness (Bruggman, Grebely, 2014). In the United States, in general, treatment uptake is declining, and studies predict that if this trend continues, only 14.5% of estimated liver-related deaths due to HCV between 2002-2030 will be prevented by therapy (Grebley, Dore, 2011).

Additionally, physicians exhibit unsatisfactory knowledge and practices with regards to hepatitis C patients. Studies in Western Saudi Arabia, Iran, Canada, and the United States have illustrated that health care providers and physicians under report, under diagnose, under vaccinate, and undertreat hepatitis C. One study of family physicians in Canada demonstrated that many primary care providers (PCPs) believe HCV care to be outside of their scope of practice and consequently, they do not offer these types of services (Cox, et al, 2010). Another survey of family medicine and internal medicine physicians in the United States determined that both specialties showed significant gaps in knowledge regarding recommendations to vaccinate HCV-positive patients against hepatitis A and hepatitis B, though the gap was more statistically significant in family medicine physicians (Tenner, et al, 2012).

Rationale

Though clinical research has shown the efficacy of certain preventive policies, treatment regimens, and screening guidelines, research on providers consistently reveals gaps in knowledge regarding the number of HCV patients remaining undiagnosed and untreated, why certain barriers to care exist, and how to overcome these barriers. A Knowledge, Attitudes and Practices (KAP) survey serves to elicit quantitative and qualitative information formatted in a questionnaire that can reveal misunderstandings or misconceptions regarding a certain topic (USAID, 2011). By targeting this kind of study towards providers in Arizona, we aimed to gain invaluable knowledge regarding the role that providers play in the general lack of HCV awareness, diagnosis, and treatment in our community that could result in initiatives and policy changes that will impact the future landscape of HCV in Arizona. As such, we sought to use this type of study to answer the question, "Do the knowledge, attitudes, and practices of Arizona providers regarding HCV and HCV patients inhibit their ability to diagnose, treat, and manage HCV patients?"

METHODS & MATERIALS

Study Design

This KAP survey was designed by the investigating medical student and the principle investigator. Survey questions were further reviewed by medical officers, county and state epidemiologists, and HCV subject matter experts at the Arizona Department of Health Services (ADHS) before distribution. Some survey questions were modeled after questions used in other KAP studies, while other questions were designed specifically to elicit particular information relevant to Arizona providers. The survey was forty questions long, with up to four additional conditional questions if participants answer the preceding question in a particular way (Table 1). There were twelve demographic questions, ten knowledge questions, eight attitudes questions, and ten practices questions included in the final survey. Knowledge questions assessed factual knowledge regarding hepatitis C virus via true or false or "select all that apply," type questions. Attitudes questions were ranked on a Likert scale (1 = Strongly disagree, 5 = Strongly agree). Practices questions were answered using multiple-choice options. Questions were entered into Qualtrics, an online survey software tool that served as the data collection tool. The survey was prefaced with a disclosure email to providers discussing the purpose of the study, what the data will be used for, and asking for their voluntary participation in the study.

Demographics

1. *What is your sex?*
2. *How old are you?*
3. *What is your medical degree?*
4. *What is your specialty?*
    a. *Please specify which specialty within Internal Medicine*
5. *Are you a currently practicing healthcare provider?*
6. *In what county do you primarily practice?*
7. *In what kind of health care setting do you primarily practice?*
8. *How many patients do you see per week on average?*
9. *What percentage of your patient population was born between 1945-1965?*
10. *What percentage of your patients are insured?*
11. *Of those who are insured, what percentage of your patients are on AHCCCS (Arizona State Medicaid)?*
12. *What percentage of your patients do you think are using intravenous (IV) drugs?*

Knowledge

1. *There is a vaccine for Hepatitis C.*
2. *Intravenous (IV) drug users should be screened for hepatitis C.*
3. *Patients born between 1945-1965 should be screened for hepatitis C.*
4. *Hepatitis C can become a chronic infection.*
5. *There are drugs available that can cure hepatitis C.*
6. *Hepatitis C is associated with an increased risk of liver cancer.*
7. *A person may be infected with hepatitis C virus and have no symptoms.*
8. *A patient who has had hepatitis C cannot be reinfected because they are immune.*
9. *The presence of hepatitis C RNA is diagnostic of an HCV infection.*
10. *Hepatitis C can be transmitted through the following ways (please select all that apply).*

Attitudes

1. *I feel sorry for people who contracted HCV through a blood transfusion*
2. *I feel sorry for people who contracted HCV through using intravenous (IV) drugs*
3. *Screening for HCV falls under my scope of practice.*
4. *I do not screen certain patients for HCV because they would not be eligible for treatment.*
5. *I feel confident in my knowledge of who to screen for HCV.*
6. *I feel comfortable treating and managing a HCV patient myself.*
7. *I believe that hepatitis C is a significant public health threat.*
8. *I feel confident in my ability to interpret HCV screening or test results.*

Practices

1. *Do you routinely screen patients for HCV?*
    a. *Which patients do you screen for HCV?*
2. *Do you have systematic reminders in your electronic medical record (EMR) system to flag when to screen a patient for HCV?*
3. *Do you see any patients who have hepatitis C?*
4. *Do you treat any newly diagnosed HCV cases yourself?*
5. *Do you refer newly diagnosed HCV patients to specialists?*
6. *Do you have patients with HCV that would benefit from treatment but are currently untreated?*
    a. *What are barriers to treatment for these patients?*
7. *Do you counsel HCV-positive patients about preventing transmission to other people?*
8. *Do you counsel HCV-positive patients about their prognosis and provide any recommendations for minimizing morbidity and mortality?*
9. *Do you order additional tests after a patient has a positive HCV screening result?*
10. *Would you like to treat HCV in your office?*
    a. *Why would you prefer to not manage HCV in your office?*

Table 1: Final KAP Study Questions

Recruitment

The survey was distributed electronically using eight ADHS email listservs and county-specific email listservs with licensed providers in Arizona (Table 2), reaching approximately 5,000 providers. The survey remained open for 3 months and was distributed to the same listservs periodically throughout that time frame.

Statistical Analysis

At its conclusion, 102 study participants had begun the survey. In order to prevent skewing the data or creating bias, we only analyzed data from surveys that had been completed in their entirety. Consequently, final analysis included 77 respondents. True or false knowledge questions were converted to a binary scale with "1" representing a correct answer, then analyzed. Multiple choice knowledge questions were analyzed qualitatively. Attitudes questions were converted to a numerical score (1-5), with a higher number score representing a more empathetic response. Practices questions were either converted to a binary scale or left in their original format for further qualitative analysis.

Statistical analysis was completed using a mixture of Univariate Logistic Regression, Fisher's Exact tests, Wilcoxon Rank Sums, and Kruskal Wallis tests.

1. *Arizona Academy of Family Physicians (AzAFP)*
2. *Arizona Alliance for Community Health Centers (AACHC)*
3. *Arizona Department of Health Services Mobile Application*
4. *Arizona Infectious Disease Society (ArIDS)*
5. *Arizona Medical Association (ArMA)*
6. *Arizona Nurse Practitioner Council (CAzNAP)*
7. *Health Action Network (HAN)*
8. *Maricopa County Medical Society (MCMS)*

Table 2: Email Listservs Utilized to Distribute Survey

RESULTS

Demographics

Of the 77 participants included in the final analysis, 31 were NPs or RNs, while 46 participants were MDs or DOs. 35 men and 42 women completed the study. A majority of participants were middle-age or older providers (aged fifty-one or older). There were 26 family medicine providers, 11 inpatient internal medicine providers, 5 gastroenterology/hepatology providers and a smaller number of other specialty providers who participated. 61 participants lived in an urban county (Maricopa or Pima Counties), and 49 participants practice in outpatient, non-urgent clinical settings (Table 3).

Variables	N=77
Provider's Age, Years (n, %)	
< 40	18 (23.4)
41-50	14 (18.2)
51-60	24 (31.2)
>60	21 (27.3)
Gender (Male, %)	35 (45.5)
Gender (Female, %)	42 (55.5)
Medical Degree (n, %)	
NP/RN	31 (40.3)
MD/DO	46 (59.7)
Specialty (n, %)	
Primary Care	39 (50.7)
Non-Primary Care/Surgical	38 (49.4)
Country Where Practice (n, %)	
Maricopa	47 (61.0)
Pima	14 (18.2)
Other	16 (20.8)
Practice Setting (n, %)	
Inpatient	18 (23.4)
Outpatient	45 (58.4)
Other	14 (18.2)
Number of Patients per Week (n, %)	
< 20	20 (25.9)
21 - 40	20 (25.9)
41 – 60	10 (13.0)
>60	27 (35.1)
Patients Born between 1945-1965 (n, %)	
0-25%	17 (22.1)
26-50%	37 (28.1)
>50%	23 (29.9)
Patients Insured (n, %)	
< 50%	16 (20.8)
51 – 75%	17 (22.1)
76-100%	44 (57.1)
Patients on AHCCCS (n, %)	
< 50%	52 (67.5)
51- 75%	17 (22.1)
76-100%	8 (10.4)
Patients on IV drugs (n, %)	
$\leq$ 10%	62 (80.5)
>10%	15 (19.5)

Table 3: Participant Demographics

Knowledge

Overall, a majority of respondents correctly identified that HCV is predominantly a bloodborne disease, and several also correctly identified that hepatitis C may also be transmitted sexually or perinatally. However, almost ¼ of respondents (n = 19) incorrectly identified saliva as a mechanism of transmission, and five respondents identified mosquitos as a mechanism of transmission. Only 18 respondents correctly identified all mechanisms of transmission correctly (Figure 1).

Nineteen percent of respondents incorrectly answered that the presence of HCV RNA is not diagnostic of an HCV infection. 14% of respondents incorrectly answered that patients cannot be reinfected with HCV because they are able to develop immunity. 11% of respondents incorrectly answered that there is a vaccine for hepatitis C. 9% incorrectly answered that there are not drugs available to treat hepatitis C.

In general, MD/DOs answered knowledge questions correctly more often than NP/RNs. There was a statistically significant difference in the number of MD/DOs that correctly answered that HCV can be transmitted via blood transfusions and perinatally compared to NP/RN participants ($p < 0.01$ and $p < 0.05$ respectively). Only 24% of participants answered all knowledge questions correctly and only 22% of outpatient providers answered all knowledge questions correctly. There was a statically significant difference in the number of providers in Maricopa who correctly identified that HCV can be transmitted via sexual contact and via unsterile tattooing compared to providers in other rural counties (not including Pima) ($p < 0.001$).

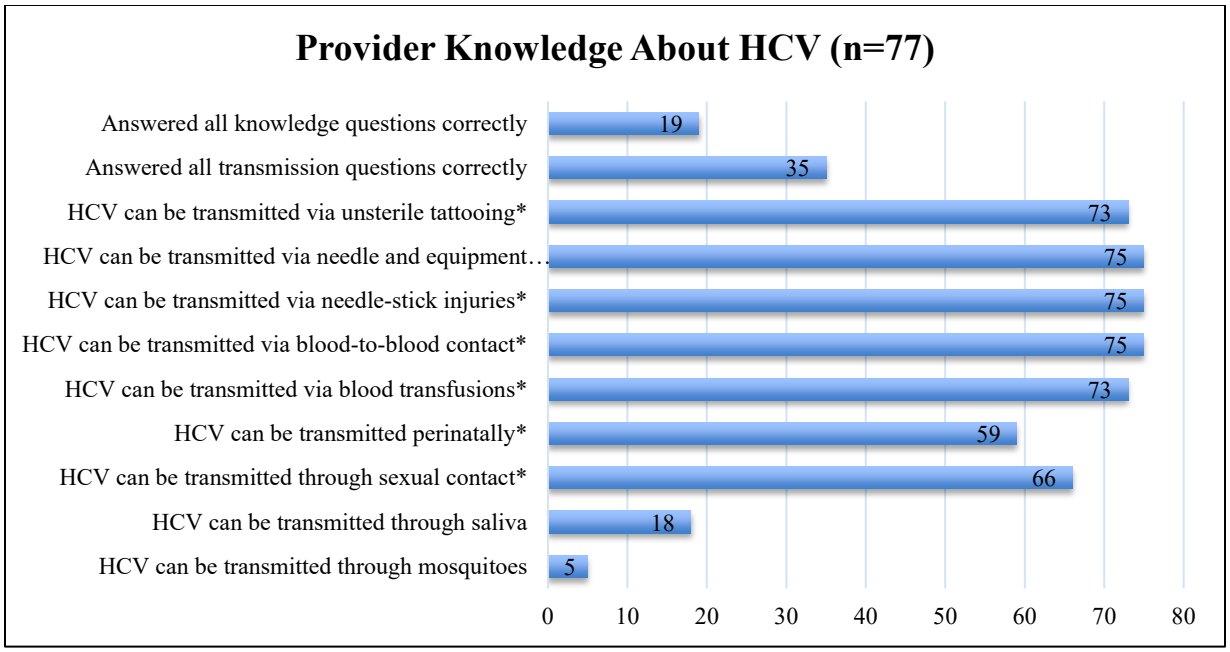

Figure 1: Participant Knowledge About HCV
**Indicates a true statement*

Attitudes

Attitudes questions were generally divided into two categories for analysis: "confidence" and "empathy". When asked about levels of empathy for HCV patients who were infected through a blood transfusion, respondents on average agreed that they felt sorry for those patients (average Likert score = 4.39). However, respondents felt less empathetic when asked about HCV patients who were infected through IV drug use (average Likert score = 3.95). Only 4 respondents when asked about empathy for IV drug users disagreed that they felt sorry for these patients, and they were family medicine, internal medicine and surgical practitioners.

Seventy-one percent of participants "Agree" or "Strongly Agree" that screening for HCV falls under their scope of practice, while only 12% of participants, including 100% of EM participants, outright disagreed that screening for HCV falls under their scope of practice. Participants felt confident about who to screen for HCV (average Likert score = 4.16), but were less confident about interpreting HCV screening tests (average Likert score = 3.89), and were not at all confident about treating or managing these patients on their own (average Likert score = 2.45) There was a statistically significant difference in how confident primary care providers felt in their knowledge of who to screen for HCV compared to non-primary care or surgical providers ($p < 0.05$).

For questions unrelated to empathy or confidence, participants reported that they believe HCV is a significant public health issue (average Likert score = 4.49).

A comparison between overall empathy and confidence versus clinical practices such as screening, counseling, and treating patients revealed a statistically significant relationship between those that engage in each of those clinical practices and overall confidence ($p < 0.001$), but no statistically significant relationship between those same participants and overall empathy. There also was no statistically significant relationship between overall empathy or confidence and those participants able to correctly answer all knowledge questions or all transmission questions correctly.

Practices

Screening & Diagnosis

Screening practices varied widely across respondents. While 71% of respondents noted that they believe screening for HCV falls in under their scope of practice, only 42% of respondents, including only 53% of outpatient participants, endorse routinely screening patients for HCV, and only 46% of respondents noted that they order further follow-up testing after a positive screening result. When analyzed demographically, there was a statistically significant difference in the number of primary care providers who routinely screen patients for HCV compared to non-primary care or surgical providers, and in the number of providers in Maricopa who routinely screen patients compared to those in Pima ($p < 0.05$ respectively). Further, there was a statistically significant difference in the number of MD/DOs, primary care providers, and outpatient providers who ordered follow-up tests after a positive screening result compared to their counterparts ($p < 0.05$ respectively).

However, of those who do routinely screen patients, a majority of study participants knew to screen patients in all categories asked about (Figure 2). Of concern, 35% of family medicine providers do not routinely screen the children of HCV mothers. Only 15% of respondents noted that they have systematic reminders in their electronic medical records to flag when a patient should be screened for hepatitis C.

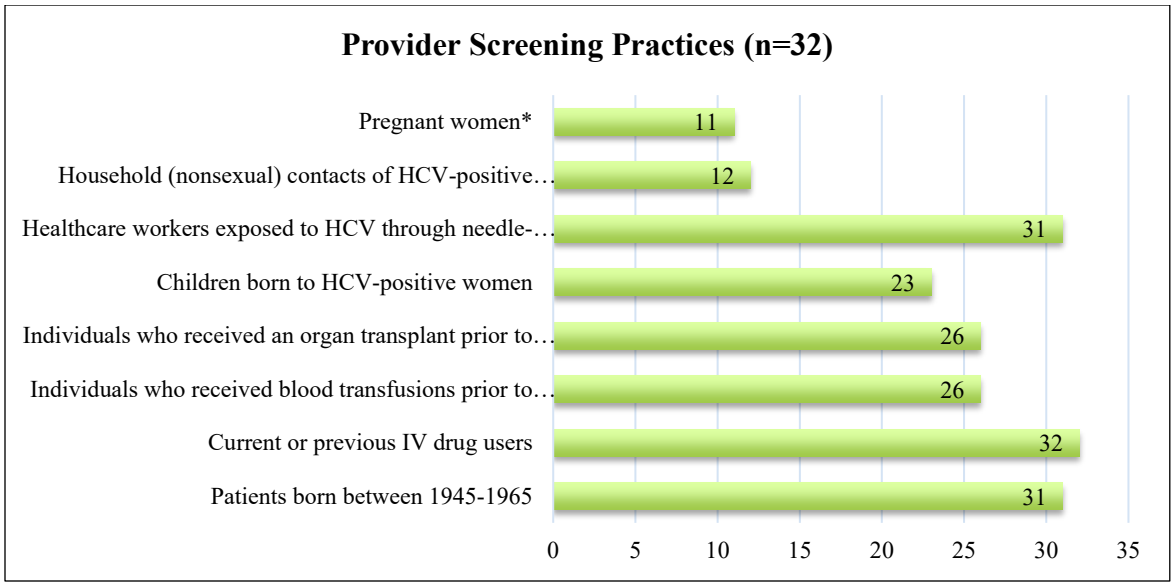

Figure 2: Participant Screening Practices

**Indicates a screening practice not necessarily recommended by the CDC*

Treatment

Almost all participants see patients who have hepatitis C (92%), but a majority of participants (almost 66%) replied that they almost always refer an HCV-positive patient to a specialist, rather than treating the patient themselves; and only 22% of respondents answered that they would like to treat HCV in their office. For those respondents who preferred to not manage HCV in their office (n=62), 53%, including 42% of outpatient providers, said it was because they felt that treatment of HCV is outside of the scope of their practice (Table 4). Upon further analysis, there was a statistically significant difference in the number of MD/DOs and non-primary care or surgical providers who believe treatment to be outside of their scope of practice compared to NP/RNs and primary care providers ($p < 0.01$ respectively). Interestingly, only 28% of providers feel they have insufficient clinical knowledge to treat HCV patients. While only 8 participants identified that they felt these patients were difficult and time consuming to manage, those with higher proportions of Medicaid patients and those with patient populations containing a higher percentage of IV drug users were more likely to answer this way.

Fifty-three percent of respondents answered that they have patients with HCV that would benefit from treatment but who are currently untreated. The most commonly cited reason overall for lack of treatment despite its potential benefit to patients was due to insurance coverage or cost concerns (Table 5). When analyzed demographically, there was a statistically significant difference in the number of patients who would benefit from treatment amongst MD/DO participants versus NP/RN participants ($p < 0.05$) and amongst providers with fewer than 10% of their patient population as IV drug users versus more than 10% ($p < 0.05$).

Reasons for not wanting to treat	
Answers	Number of responses (n=62)
Treatment of HCV is outside of the scope of my practice.	33
I feel I have insufficient clinical knowledge about how to manage HCV.	22
I believe these are difficult to manage patients and I do not have time to manage them adequately.	8
I have concerns about the cost that I could incur by treating HCV-positive patients.	9
Inappropriate clinical setting to treat HCV (psych clinic, wound clinic, etc.).	5
It's not a personal passion of mine.	1

Table 4: Reasons for Not Wanting to Treat HCV

Barriers to Treatment	
Answers	Number of Responses (n=42)
Patient's insurance will not cover treatment/patient is uninsured/cost of treatment is prohibitive.	35
Patient is not interested in treatment (concerns about side effect profile, lack of knowledge, etc.).	24
Patient is noncompliant with treatment or continues high-risk behaviors that would disqualify them from treatment.	24
I would not recommend treatment because of patient factors (age, current health status, etc.).	3
Difficulty getting an appointment with specialists.	1

Table 5: Barriers to Treatment per Study Participants

Counseling

When asked whether they routinely counseled HCV-positive patients on how to prevent transmission to other people, only 38 providers said that they almost always counsel their patients, while 21 responded that they almost never counseled their patients on preventing transmission. A multivariate analysis determined a statistically significant relationship between those who do counsel patients about preventing transmission and those who were able to answer all knowledge questions correctly ($p < 0.05$).

When asked about counseling patients regarding minimizing morbidity and mortality, practices varied widely across respondents, though most participants counseled patients on at least one topic (Figure 3). Only 8% of participants did not counsel patients regarding ways to reduce morbidity and mortality at all, and there was a statistically significant difference in the number of females that did not counsel patients at all compared to the number of males ($p < 0.05$). The most common topic to counsel patients on was avoiding alcohol consumption and the least common to counsel on using fresh or clean needles. Interestingly, there was a statistically significant difference in the number of NP/RNs that counseled patients on avoiding alcohol and using only clean or fresh needles compared to MD/DOs ($p < 0.05$ respectively). There was also a statistically significant difference in the number of primary care providers that counseled patients in almost every topic except for avoiding acetaminophen containing drugs compared to no-primary care and surgical providers ($p <0.05$).

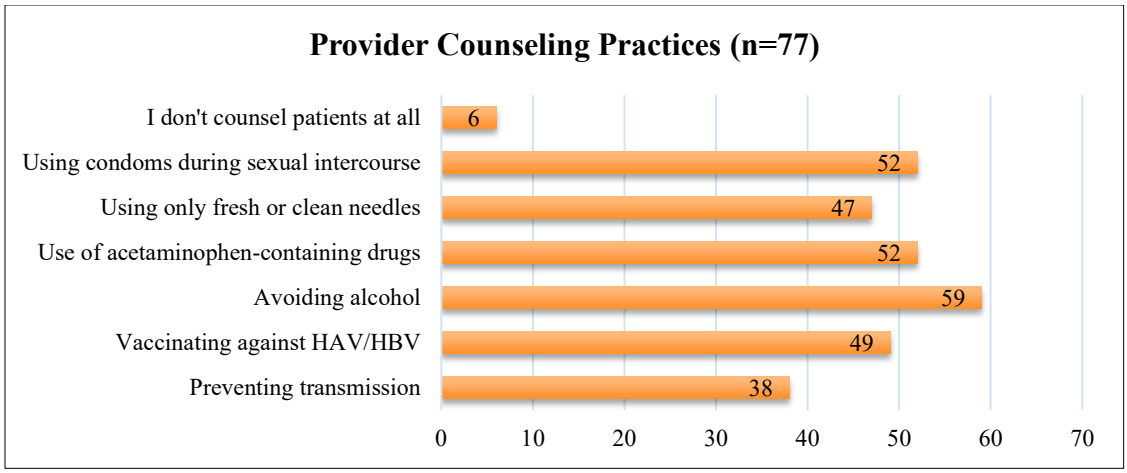

Figure 3: Participant Counseling Practices

DISCUSSION

Literature reviews reveal a lack of available studies regarding physician knowledge and attitudes towards HCV. Of those that do exist, only a few have been completed here in the United States and none have been completed regarding Hepatitis C in Arizona.

Numerous studies have tried to determine the barriers to HCV treatment, which are extensive, and include lack of provider expertise in HCV and limited access to specialists (Morrill, et al, 2005). However, one study in the Veterans Affairs system determined that the strongest independent predictor of HCV treatment was attending one visit with an HCV specialist (Kramer, et al, 2011). Another study found that patients in Australia who had sought HCV care from a trained provider were more likely to receive treatment (Grebely, et al, 2011). While these studies also noted significant structural barriers to HCV assessment and care including limited knowledge of testing locations, limited accessibility of testing results and treatment, and long waiting lists for treatment, they indicate that improving physician knowledge and accessibility could be an avenue for potential solutions.

Knowledge

Overall, Arizona providers demonstrated an adequate baseline knowledge regarding HCV and its means of transmission. While only a small minority of participants correctly answered all knowledge questions, most respondents were able to correctly answer the commonly known or asked questions regarding HCV. While our results do identify some gaps in knowledge, these gaps are higher level questions including that hepatitis C can be transmitted sexually and perinatally.

Other questions that participants failed to answer correctly consistently included that there is a cure for HCV and that the presence of HCV RNA is diagnostic of an infection, which is concerning. Interestingly, in spite of this, a majority of respondents believe they have sufficient knowledge about hepatitis C, which likely indicates that providers are overestimating their capabilities and may also demonstrate that providers have a difficult time admitting when they do not know something or when they are wrong.

It is not surprising that MD/DOs performed better on the knowledge questions compared to NP/RNs as the level of training required for MD/DOs tends to be higher and more comprehensive.

Attitudes

Participants demonstrated a marked bias towards HCV-positive patients who were also IV drug users, highlighting the continued bias many providers have against certain patient populations that engage in these behaviors.

The gradation in attitudes towards screening, diagnosis, and treatment of HCV is understandable and follows the natural progression of HCV management over the past several decades. Screening for HCV has commonly fallen under primary care's responsibilities, while treatment of HCV has commonly fallen under the specialist's scope of practice. This was likely largely driven by the fact that HCV previously was incurable, and the drugs used to manage HCV were complex with difficult side effect profiles. Currently, treatment of HCV is much more straightforward as the medications are much more tolerable and only need to be used for a relatively short period of time for successful treatment. However, these treatment modalities are still relatively new and were only developed within the last ten years. We believe that the attitudes identified in our study toward comfort with diagnosing and treating HCV reflect the recent changes to HCV management over the past few years and will likely change given more time to become familiar with the available treatment medications. That said, we also are unsurprised by the fact that those with strong clinical practices regarding HCV also feel more overall confidence, as they are likely less concerned about causing a patient harm if via misdiagnosing them or incorrectly treating them if they are more comfortable with the required knowledge to do so.

Screening & Diagnosis

While many participants agreed that screening for HCV falls under their scope of practice and most participants knew which patient populations to screen, a minority actually perform routine screening, possibly indicating that providers do not prioritize screening for HCV

compared to other routine health maintenance screening or they lack adequate time with patients to consider screening them for all recommended health maintenance issues. It is also possible that once again, providers are overestimating their capabilities and clinical practices. Further, participants rarely ordered follow-up testing after a positive screening result, implying a fundamental lack of understanding of the pathogenesis of HCV infection. Of those that do order follow-up testing, we would expect MD/DOs, primary care providers, and outpatient providers to be more familiar with which follow-up tests to order and how given their expected wider knowledge base about HCV and stronger screening practices due to the inherent nature of their clinical practice. While the statistically significant difference in the practices amongst these provider groups is expected and encouraging, our results indicate that screening practices are insufficient across all groups included in this study, particularly amongst outpatient providers who should be familiar with screening guidelines and accustomed to performing these types of screening exams, but still are only doing so a minority of the time.

Given that so few participants have systematic reminders in their EMRs and so many participants do not consistently screen, it is possible that working with healthcare systems and EMRs to insert such reminders when patients fall within certain identified demographics may help improve clinical practice.

Treatment

Scope of practice remains a large barrier to care for these patients. The gap between those who do not treat HCV and those who refer patients to specialists indicates that some providers truly do not feel responsible for helping treat HCV and perhaps even indicates a larger attitude that providers do not bear responsibility for patients outside of their direct care. Further, we conclude that the effort to shift treatment and management of HCV from specialty care to outpatient care has either been unsuccessful or is still in the early stages of this process. This may be because outpatient providers already feel overburdened by the scope of the care they must provide to patients. We also conclude that the difference in how MD/DOs feel about treatment for HCV being within their scope of practice compared to NP/RNs may reflect the

status of our healthcare system, in which MD/DOs are typically specialized or very subspecialized and cannot switch specialties easily.

Contrary to what we expected, providers did not express that they did not want to treat HCV because they felt they had insufficient knowledge regarding it or because they felt like these patients were too medically complicated to take on, with the exception of providers who had patient panels containing higher percentages of Medicaid patients or IV drug users. However, it was clear from our results that the cost of care and treatment continues to be a large barrier for patients.

Counseling

Counseling practices were a further gap identified in the care of the patients. A minority of respondents identified that they regularly counsel their HCV patients on how to prevent transmission to others and on how to minimize morbidity and mortality. Of those that did, only primary care providers regularly counseled patients about multiple ways to minimize morbidity and mortality, likely as counseling typically falls under a primary care provider's scope of practice. The lack of counseling about reducing transmission may indicate that these providers either do not consider HCV to be a highly communicable disease the way they consider HIV to be, or they are primarily concerned with individual patient outcomes relevant to their patient panel rather than population health or the well-being of those who do not fall directly under their care. Additionally, the least common topic to counsel patients on was using only clean or fresh needles, indicating an inability or lack of desire to address this topic and a possible inherent bias toward these patients.

CONCLUSION & FUTURE CONSIDERATIONS

The data generated through this survey is unique and helps determine Arizona providers' current capacity to diagnose and treat hepatitis C. Ultimately, we conclude that while AZ providers consider HCV to be a significant public health issue, they also have inadequate knowledge of hepatitis C that drives insufficient clinical practices around screening patients for hepatitis C, diagnosing new cases of hepatitis C, and helping manage these patients on a regular basis. Though outpatient and primary care providers typically had stronger practices in this study compared to their non-primary care, surgical, or inpatient counterparts, a minority demonstrated adequate performance in all categories. Their unfamiliarity with the topic and treatment modalities, coupled with inherent biases towards some of this patient population is in direct opposition to their perceptions regarding their own capability and comfort levels in caring for these patients, indicating a further gap in their awareness of this issue and the vulnerability that this patient population faces.

We further conclude that hepatitis C patients in Arizona continue to face tremendous barriers to treatment due to concerns over the cost of treatment or insurance coverage and the fact that most providers do not believe that treating hepatitis C falls under their scope of practice, a fact that has been demonstrated in other studies as well. The push to transition diagnosis and treatment of HCV from specialty services to primary care has yet to take full effect and offers a further opportunity for us to continue educating primary care and outpatient providers about the new treatment modalities for HCV in order to better offer access to care for these patients.

In addition to identifying several general trends, we have also been able to identify specific gaps in knowledge, attitudes, and practices that interfere with clinical practice around these patients. These specific gaps may be easily addressed moving forward with increased educational campaigns, specifically around all the ways in which HCV can be transmitted, and counseling practices to reduce transmission and morbidity and mortality.

While we originally may have hypothesized that provider confidence in their familiarity and practices with HCV would enhance their clinical practice with HCV patients, we also hypothesized that a lack of empathy for this patient population would inhibit their clinical practice. Per our results, we found no significant relationships between overall provider empathy for HCV patients and their clinical practices, perhaps reflecting a limitation of this study due to its small sample size or population sample.

This study has several limitations. While it is a much larger study and the first study of this type conducted in Arizona, the study should be repeated for validity. Further, there is an inherent level of selection bias as the study population was self-selecting. We tried to minimize levels of bias by only analyzing fully completed questionnaires and those completed by providers who are still currently practicing. However, there were several respondents included in the final analysis who did not practice in clinical settings or specialties that inherently lend themselves to care of hepatitis C patients.

We hope to use this data to create targeted interventions for some of the gaps identified in this study. Further studies are needed to better determine the impact of specialty care on patient outcomes in this population, the level of access to specialty care for these patients, and the demographics of this patient population. Additionally, it would be interesting to further study the referral process that occurs when a patient screens positive for HCV to better understand the ways in which we can continue to transition diagnosis and care of HCV from specialty services to primary care services.

REFERENCES

1. Alter, MJ. Hepatitis C virus infection in the United States. Journal of Hepatology 1999; 31(1): 88-91.
2. Arain A, Robaeys G. Eligibility of persons who inject drugs for treatment of hepatitis C virus infection. World Journal of Gastroenterol 2014, September 28; 20(36): 12722-12733.
3. Arizona Department of Health Services [Internet]. Hepatitis C [cited April 11, 2016]. Available from http://www.azdhs.gov/preparedness/epidemiology-disease-control/hepatitis/index.php#c-home.
4. Bruggmann P, Grebely J. Prevention, treatment and care of hepatitis C virus infection among people who inject drugs. International Journal of Drug Policy 26 (2015) 522-526.
5. Centers for Disease Control and Prevention. Recommendations for prevention and control of hepatitis C virus (HCV) infection and HCV-related chronic disease. MMWR 1998;47(No. RR-19): 1-39.
6. Cox J, Graves L, Marks E, Tremblay C, Stephenson R, Lambert-Lanning A, Steben M. Knowledge, attitudes and behaviours associated with the provision of hepatitis C care by Canadian family physicians. Journal of Viral Hepatitis. 2011; 18:e332-340.
7. Feeney E, Chung R, Yazdanpanah Y. Current guidelines and prioritizing treatment of hepatitis C virus in HIV-infected patients. HIV AIDS 2015, 10:323-329.
8. Grebely J, Bryant J, Hull P, Hopwood M, Lavis Y, Dore GJ, et al. Factors associated with specialist assessment and treatment for hepatitis C virus infection in New South Wales, Australia. J Viral Hepat 2011;18:e104-e116.
9. Grebely J, Dore G. An expanding role for primary care providers in the treatment of hepatitis C virus infection in the community. Hepatology. 2011 Dec;54(6): 2258-60
10. Grint D, Peters L, Shwarze-Zander C, Beniowski M, Pradier C, Battegay M, Jevtovic D, Soriano V, Lundgren JD, Rockstroh JK, Kirk O, Mocroft A. Temporal changes and regional differences in treatment uptake of hepatitis C therapy in EuroSIDA. HIV Medicine (2013), 14, 614-623.
11. Hofmesiter MG, Rosenthal EM, Barker LK, Rosenberg ES, Barranco MA, Hall EW, Edlin BR, Mermin J, Ward JW, Ryerson AB. Estimating prevalence of hepatitis C Virus Infection in the United States, 2013-2016. Hepatology. 2018:XX(X):pp-pp.
12. Jones L, Atkinson A, Bates G, McCoy E, Porcellato L, Beynon C, McVeigh J, Bellis MA. Views and experiences of hepatitis C testing and diagnosis among people who inject drugs: systematic review of qualitative research. International Journal of Drug Policy 25 (2014) 204-211.
13. Joukar F, Mansour-Ghanaei F, Soati F, Meskinkhoda P. Knowledge levels and attitudes of health care professionals toward patients with heptatitis C infection. World J Gastroenterol. 2012 May 14; 18(18): 2238-2244

14. Kabir A, Tabatabaei S, Khaleghi S, Agah S, Kashani A, Moghimi M, et al. Knowledge, attitudes and practice of Iranian medical specialists regarding Hepatitis B and C. Hepat Mon. 2010; 10(3): 176-182.

15. Kramer JR, Kanwal F, Richardson P, Giordano TP, Petersen LA, El-Serag HB. Importance of patient, provider, and facility predictors of hepatitis C virus treatment in veterans: a national study. Am J Gastroenterol. 2011;106:483-491.

16. Ly KN, Xing J, Klevens RM, Jiles RB, Ward JW, Holmberg SD. The Increasing Burden of Mortality From Viral Hepatitis in the United States Between 1999 and 2007. Ann Intern Med. 2012;156:271-278. doi:10.7326/0003-4819-156-4-201202210-00

17. Medicins du Monde & USAID. The KAP Survey Model (Knowledge, Attitudes, & Practices). 2011.

18. Morrill JA, Shrestha M, Grant RW. Barriers to the treatment of hepatitis C: patient, provider, and system factors. J Gen Intern Med. 2005: 20:754–8.

19. Peters L, Klein M. Epidemiology of hepatitis C virus in HIV-infected patients. HIV AIDS 2015, 10:297-302.

20. Schaerer V, Haubitz S, Kovari H, Ledergerber B, Ambrosioni J, Cavassini M, Stoeckle M, Schmid P, Decosterd L, Aouri M, Boni J, Gunthard, HF, Furrer H, Metzner KJ, Fehr J, Rauch A. Protease inhibitors to treat hepatitis C in the Swiss HIV Cohort Study: high efficacy but low treatment uptake. HIV Medicine 2015, 16, 599-607.

21. Tenner CT, Herzog K, Chaudhari S, Bini EJ, Weinshel EH. Knowledge, attitudes and barriers regarding vaccination against hepatitis A and B in patients with chronic hepatitis C virus infection: a survey of family medicine and internal medicine physicians in the United States. International Journal of Clinical Practice. 2012 October; 66(10):1009-1013.

22. World Health Organization. Guidelines for the screening, care and treatment of persons with hepatitis C infection. 2014. [cited April 11, 2016]. http://apps.who.int/iris/bitstream/10665/111747/1/9789241548755_eng.pdf?ua=1&ua=1